The role of social cognition in collaborative learning in healthy older adults

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The role of social cognition in collaborative learning in healthy older adults

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Introduction

Learning and memory abilities decline in healthy ageing.[1] Learning collaboratively with a familiar partner may improve older adults' learning performance. [2]

We examined older adults' learning with familiar and unfamiliar partners, and with perceived Human and Computer partners.

The study aim was to determine whether better social abilities underlie more efficient learning with different learning partners.

Method

Study 1

Participants: 24 older (mean = 68.88 years, SD = 7.19) adults.

Participants completed the task in pairs, once with a familiar partner and once with a stranger.

Each pair had a Director and Matcher. The Director's set of tangrams were arranged in a specific order, which was communicated to the Matcher. Pairs work together to create and learn referential labels, and interaction becomes more efficient.

Figure 1: Unfamiliar participants complete the Study 1 task.

Study 2

Participants: 24 older (mean = 70.46 years, SD = 7.34) adults.

Participants completed a similar task with a Wizard of Oz computer program assuming the role of Director.

"Human" condition: participants told communicating with a Research Assistant in the next room, and the program used natural speech recordings. Deception was successful.

"Computer" condition: participants heard the same instructions in a synthetic speech voice.

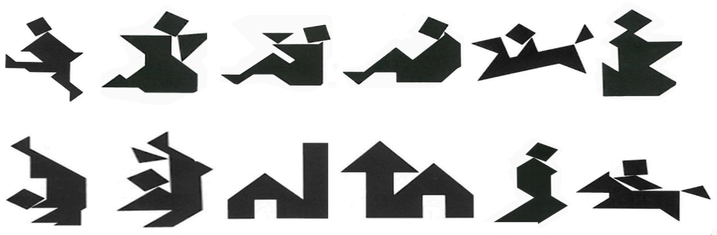

Figure 2: Tangram stimuli used in Studies 1 and 2

Social cognition was assessed using Reading the Mind in the Eyes[3], Ekman Faces[4], Visual Perspective Taking[5] (Study 1), Judgment of Preference[6] (Study 1) and Theory of Mind Stories[7] (Study 2).

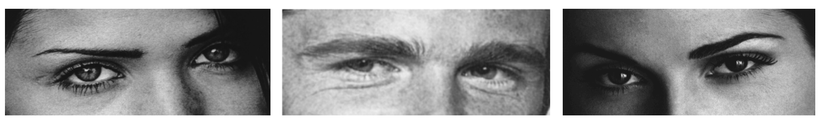

Figure 3: Reading the Mind in the Eyes example stimuli used to assess social cognition in Studies 1 and 2

Nine trials were completed in each condition collapsed into three trial bins.

Results

Speed of learning was measured using time to complete the task and the number of interactive turns taken.

Study 1

Unfamiliar and familiar partners learned at a similar rate.

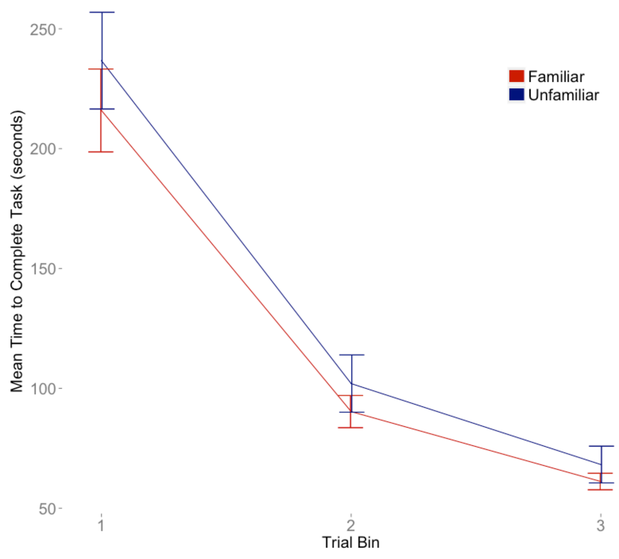

Figure 4: Mean and standard error for time to complete the task with familiar and unfamiliar partners.

Study 2

Participants were initially quicker when interacting with the "Computer", but by final trials, they were significantly quicker when they believed they were interacting with a human.

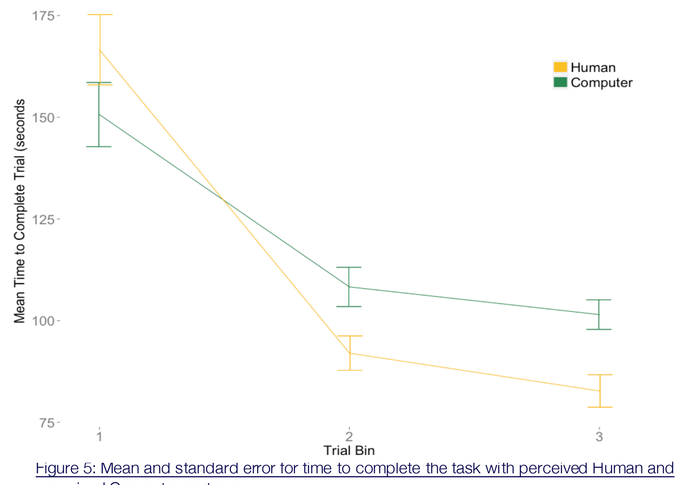

Figure 5: Mean and standard error for time to complete the task with perceived Human and perceived Computer partners.

As the biggest difference in participant performance was in early trials, this data was used to explore the relationship between social cognition, interaction and learning performance.

Study 1

Visual Perspective Taking predicted how quickly participants completed the task with Unfamiliar ($F(1,22) = 15.03$, $p = 0.0008$, $R^2 = 0.38$), but not Familiar partners ($F(1,22) = 3.05$, $p = 0.10$, $R^2 = 0.08$).

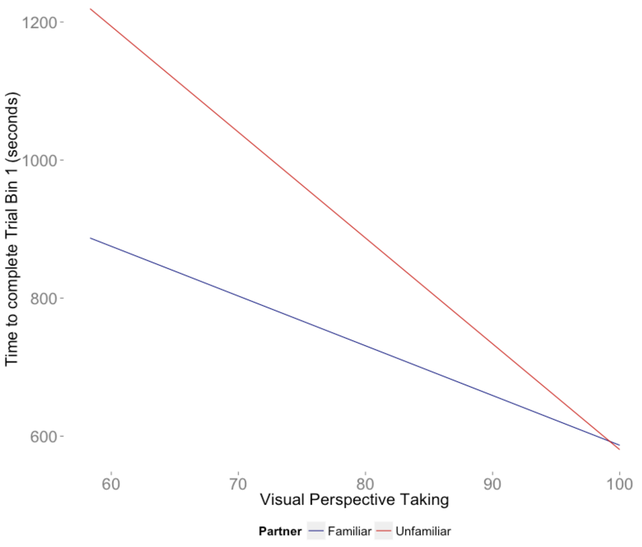

Figure 6: Social cognition predicts time to complete with unfamiliar, but not familiar partners

Study 2

Reading the Mind in the Eyes predicted how many turns participants took during with perceived Human ($F(1,22) = 8.89$, $p = 0.006$, $R^2 = 0.26$), but not Computer partners ($F(1,22) = 0.22$, $p = 0.64$, $R^2 = 0.03$).

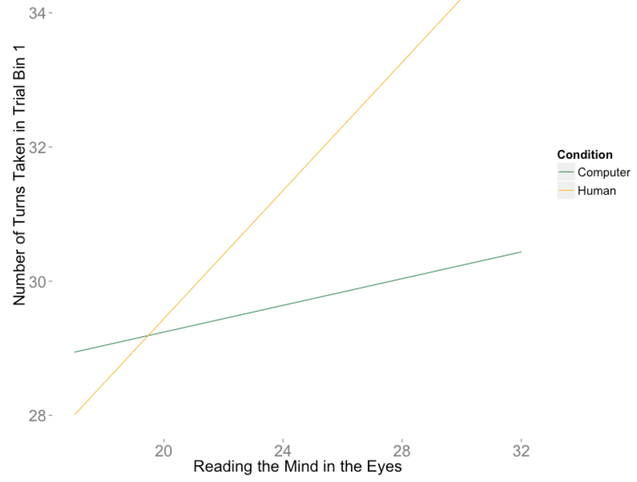

Figure 7: Social cognition predicts turns taken with human, but not computer partners.

Delayed Recall

After 1 hour, participants recalled the labels for shapes described to them by a "human" partner more accurately than those described to them by a "computer" partner (X^2 (1, N =24) = 6.58, $p < 0.05$).

Social cognition did not predict delayed recall accuracy in either the human or computer condition.

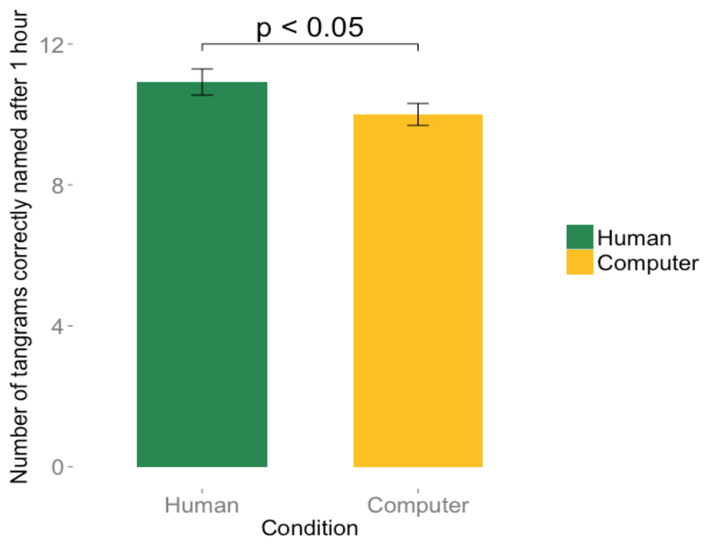

Figure 8: Mean and standard error for delayed recall of descriptions learned with "Human" & "Computer"

Conclusions

Familiarity does not differentially affect learning – older adults learn with comparable efficiency with familiar partners and strangers.

Learning with a computer system is more efficient and effective if participants are told that the computer system is a human being.

Social cognition predicts efficiency of interaction in early trials with unfamiliar partners, and perceived human partners.

Social cognition predicts interaction with perceived human partners, but does not predict recall accuracy.

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Further information

We are now conducting the same studies using a route learning task based on the Map Task[8] paradigm to explore whether these effects are task specific or generalise to other learning and memory paradigms.

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